

Executive Summary

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The Impact of STEM Investment on Macroeconomic Performance

This study investigates whether national STEM (R&D) investment truly enhances a country's economic growth and stability.

We analyzed the relationship between STEM investment and four major macroeconomic indicators — GDP, interest rate, inflation rate, and stock index — to test this widely held assumption.

Hypothesis

Null Hypothesis (H_0): STEM investment significantly drives economic growth and macroeconomic stability.

Alternative Hypothesis (H_1): STEM investment has no significant impact.

Methodology

Independent Variable: STEM investment (GBARD, USD million)
Dependent Variables: GDP, Interest rate, Inflation rate, Stock index
Period: 2020–2025 (6-year average per country)

Analysis: OLS Regression: To measure the strength and direction of relationships (β , p-value).
T-Test: To assess the statistical significance of mean differences.
ANOVA Test: To compare variations across countries and investment levels.

Model equation: $Y = \beta_0 + \beta_1 \cdot X + \varepsilon$

where X =STEM investment, Y =economic indicator

Indicator	Relationship	Significance	Interpretation
GDP	Positive ($\beta > 0$)	$p < 0.05$	Boosts national economic growth.
Interest Rate	Negative	$p < 0.05$	Enhances financial stability.
Inflation Rate	Negative	$p < 0.05$	Improves efficiency, lowers inflation.
Stock Index	Positive	$p < 0.05$	Strengthens market confidence.

Interpretation & Implications

The consistent results reveal a reinforcing cycle:
STEM Investment → Innovation → Productivity → GDP Growth → Stability → Market Confidence.
Thus, STEM investment is not merely a fiscal expense but a strategic driver of both economic expansion and long-term resilience.
Policymakers should view it as a foundation for sustainable development and innovation-based growth.